

GERRIDAE, MAINLY FROM SULAWESI AND PULAU BUTON (INDONESIA)

Notes on Malesian aquatic and semiaquatic bugs (Heteroptera), III.

Chen, P. & N. Nieser, 1992. Gerridae, mainly from Sulawesi and Pulau Buton (Indonesia). Notes on Malesian aquatic and semiaquatic bugs (Heteroptera), III. – Tijdschrift voor Entomologie 135: 145-162, figs. 1-41, table 1. [ISSN 0040-7496]. Published 1 December 1992. Gerridae mainly from Sulawesi, Pulau Buton and Sabah (E. Malaysia) are revised and keys to Indonesian genera and Sulawesi species are provided, with records and distributional notes. Nine new species are described: *Cylindrostethus akanthinos*, *Metrocoris breviculus*, *Potamometropsis anomalis*, *Rheumatometroides drepanophoros*, *R. makraitos* and *Ventidius xyle* from Sulawesi, *Ventidius xiphobion* from Sulawesi and Buton, *Tenagogonus akanthinos* and *Ventidius kurtokalami* from Sabah.

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Key words. – Sulawesi; Buton; Sabah; Gerridae; keys; new species.

As our contribution to the Fauna Malesiana program, we are working on the Nepomorpha and Gerromorpha mainly collected by staff members of the Zoological Museum Amsterdam and the National Museum of Natural History Leiden. The first part of the Gerridae, viz. a revision of the genus *Limnometra* in the Malay archipelago, was published as the second part of our series (Nieser & Chen 1992a), while Naucoridae, Nepidae and Notonectidae appeared in the first part (Nieser & Chen 1991).

The specimens studied in this paper were mainly collected by J. P. Duffels, N. Nieser, J. van Tol and G. Zimmermann on several expeditions to Sulawesi, the nearby island of Buton, and to Borneo. For more details (e.g. a list of localities) the reader is referred to Nieser & Chen (1991, 1992a). In addition, unidentified Gerridae from Indonesia kept in RMNH and ZMA have been studied. Dr. D. A. Polhemus (presently at Bishop Museum, Honolulu, Hawaii) is working on a revision of the genus *Prilomera* Amyot & Serville. Most of the specimens of this genus taken by the collectors mentioned above are at his disposal.

A key to the genera of Gerridae occurring in Indonesia and E Malaysia is included. When relevant, keys to species of Sulawesi and Buton are given as well. These should be used with caution as the fauna of the region is still poorly known.

Measurements are in millimetres and present the range or the (arithmetic) mean based on five random-

ly chosen specimens, or in case there are less than five, on all specimens available. The width of the head is measured across the eyes, the width of the thorax is measured across the metaacetabula.

Most of the females in the samples carried eggs; only where such was not the case this has been indicated.

MATERIAL

Localities are in Indonesia, unless stated otherwise. The areas in Sulawesi (Celebes) used with the localities agree with the Indonesian provinces, viz. Sulawesi Utara, Tengah and Tenggara for respectively for Northern, Central and Southeastern Sulawesi (see Whitten et al. 1988). Pulau Buton is mentioned separately although it belongs administratively to Sulawesi Tenggara.

Collections from which material has been studied or in which material has been deposited (with abbreviations in brackets) are: Museum Zoologi Bogor, Bogor, Jawa (MBB); Bagian Pertanian, Universitas Haluoleo, Kendari, Sulawesi (BPUH); J. T. Polhemus Collection (University of Colorado Museum), Englewood, Co. U. S. A. (JTPC); Snow Entomological Museum, University of Kansas, Lawrence, Kansas, U. S. A. (SEMC); N. Nieser collection, Tiel, The Netherlands (NC); P. Chen collection, Beijing, P. R. China (PCHC); National Museum of Natural History (Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands (RMNH); G. Zimmermann collec-

tion, Marburg, B. R. D. (zc); Zoölogisch Museum, Afdeling Entomologie, Amsterdam, The Netherlands (ZMA); Zoological Museum of the University, Copenhagen (ZMC).

Specimens collected by J. P. Duffels are deposited in ZMA, those by J. van Tol in RMNH, those by G. Zimmermann in zc and those by N. Nieser in his own collection, unless otherwise stated. Deposition of material is usually specified only with rare or new species.

ACKNOWLEDGEMENTS

Thanks are due to Dr. J. P. Duffels (ZMA), Mr. J. van Tol (RMNH) and Dr. G. Zimmermann (Marburg, B. R. D.) for putting specimens in their care to our disposal; to Dr. N. Møller Andersen (ZMC) for discussing several problems in identification and Dr. I. Made Ebeneser (BPUH) for showing the senior author some interesting localities.

SYSTEMATIC PART

Key to Indonesian and East Malaysian genera of Gerridae

(Adapted from Andersen 1982)

1. Ventral lobes of head produced (fig. 1), first abdominal sternum present. Female ovipositor well developed, serrate (Rhagadotarsinae) *Rhagadotarsus*
- Ventral lobes of head not produced, first abdominal sternum absent or fused with metasternum. Female ovipositor short and nonserrate 2
2. Middle femora usually stout, shorter than middle tibia and hind femora (Trepobatinae) 3
- Middle femora slender, usually distinctly longer than middle tibiae 5
3. Metasternal scent gland opening absent *Metrobatopsis*
- Metasternal scent gland opening small but distinct 4
4. Metasternum not produced anteriorly, scent gland opening in the centre of metasternum *Rheumatometroides*
- Metasternum produced anteriorly, scent gland opening near anterior border *Stenobates*
5. Metasternum extremely reduced, usually only represented by a very short subtriangular plate enclosing the scent gland opening (Fig. 2). Claws of hind tarsi modified, straight or S-shaped (Halobatinae) 6
- Metasternum well developed, laterally clearly reaching the metaacetabular region. Claws of hind tarsi, if present, falcate 10
6. Clypeus with basal margin well defined, anterior

- margin of head not smoothly rounded. Metasternum reduced but reaching metaacetabula laterally, marine *Halobates*
- Clypeus with basal margin obliterated or lost, anterior margin of head broadly and smoothly rounded. Metasternum strongly reduced, not reaching metaacetabula laterally 7
7. Metanotum with lateral longitudinal elevation reaching intersegmental suture between meso- and metanotum. Male third antennal segment with stiff hairs on margin *Esakia*
- Metanotum with lateral longitudinal elevation indistinct or ending somewhere on metanotum, not reaching intersegmental suture between meso- and metanotum. Pilosity of third antennal segment variable, but no stiff hairs on margin . 8
8. Eyes overlapping anterolateral angles of mesonotum 9
- Eyes not overlapping anterolateral angles of mesonotum *Metrocoris*
9. Metaacetabula and hind coxa of female produced medially *Ventidiopsis*
- Metaacetabula and hind coxae of female not produced medially *Ventidius*
10. Fore tarsi long, at least one half the length of fore tibia. Metaacetabular groove dorsally reaching anterior end of first abdominal tergum (Ptilomerinae) 11
- Fore tarsi shorter. Metaacetabular groove not reaching anterior end of first abdominal tergum ... 14
11. Hind coxae with a small spine on apical margin, hind femora much longer than middle femora ... *Ptilomera*
- Hind coxae without spines, hind femora subequal to or shorter than middle femora 12
12. Anterior margin of head rounded, first antennal segment shorter than three following segments together *Rheumatogonus*
- Anterior margin of head not rounded, first antennal segment about as long as or longer than three following segments together 13
13. First antennal segment about as long as three following segments together, middle and hind tarsi with distinct claws *Potamometropsis*
- First antennal segment longer than three following segments together, middle and hind tarsi without distinct claws *Pleciobates*
14. Rostrum short, not surpassing the prosternal margin, forth antennal segment short and curved. First segment of fore tarsi less than one-half the length of second (Cylindrostethinae) *Cylindrostethus*
- Rostrum longer, clearly surpassing the prosternal margin, forth antennal segment straight. First segment of fore tarsi usually more than one-half

- the length of second segment 15
15. Wingless form with posterior lobe of pronotum absent, small species (length up to 5 mm), anterior lobe of pronotum with a central and a pair of sublateral longitudinal light stripes, tarsal claws of middle and hind legs present (Eotrechinae) *Amemboa*
- Wingless form with posterior lobe of pronotum present, usually larger species, if length about 5 mm or less, then tarsal claws of middle tarsi absent or anterior lobe of pronotum light with a dark longitudinal median stripe (Gerrinae) ... 16
16. Dorsal surface of head and abdominal venter generally dark. Metathoracic spiracle located only a little more than its own length from base of fore wing *Aquarius*
- Dorsal surface of head light or dark with longitudinal dark stripes or elongate spots, venter generally light. Metathoracic spiracle located much more than its own length from base of fore wing 17
17. Anterior lobe of pronotum dark with a large median light spot. Claws absent on middle tarsi *Neogerris*
- Anterior lobe of pronotum light or dark with a pair of small light spots. Claws present on middle tarsi 18
18. Posterior lobe of pronotum dark, usually with a median longitudinal white stripe *Limnogonus*
- Pronotum basically light with a median longitudinal dark stripe, sometimes with quite extensive other dark markings 19
19. Connexival spines normal. Male abdomen not reduced. Last ventral abdominal segment plus genital segments shorter than preceding four segments. Hind coxae of male rarely extending beyond middle of second ventral abdominal segment *Limnometra*
- Connexival spines reduced. Male abdomen reduced. Ventral abdominal segments short, last segment plus the genitalia at least as long as preceding four segments, usually longer. Hind coxae of male nearly reaching or surpassing posterior margin of second ventral abdominal segment *Tenagogenus*

GERRINAE Bianchi, 1896

Limnogonus Stål, 1868

A tropicopolitan genus with a relatively small number of, often widespread, species. Andersen (1975) provides an excellent revision of the Old World species.

Most *Limnogonus* live on small stagnant waters including cattle ponds and pools and ditches in sawahs.

Some species have good tolerance for brackish water. Three species, one with two subspecies, are known from Indonesia; all three occur in Sulawesi.

Key to *Limnogonus* of Sulawesi

1. Connexival spines well developed (fig. 3), pronotal lobe usually without a mesial pale stripe *L. nitidus*
- Connexival spines reduced, pronotal lobe with a mesial pale stripe 2
2. Pale stripe on upper part of mesopleuron tapering posteriorly, ending in front and below second spiracle (fig. 4) *L. fossarum skusei*
- Pale mesopleural stripe widened posteriorly, ending above the second spiracle (fig. 5) *L. hungerfordi*

Limnogonus fossarum fossarum (Fabricius)

Cimex fossarum Fabricius, 1775: 727.

Limnogonus fossarum; Cheng 1966: 121-127 (biology).

Limnogonus fossarum fossarum; Andersen 1975: 30-36, figs. 30-36, 49-53, 56-61, 64-67, 69, 70, 72, 73, 78-85 (redescription, synonymy); Selvanayagam & Rao 1989: 474-484 (biology); Rubia & Heong 1990: 34-35 (life history).

Material. – INDONESIA. N. Sumatra: Alas valley, Kutacane, Tanah merah, 3°31'N 97°47'E, ca. 200m, 8. VI. 1972, 3♀, leg. J. Krikken No 9; NE Sumatra: Kuala Simpang, lowland cultivated area, at light, XI. 1953, 2♂ 5♀; same II. 1964, 1♂, leg. A. Sollaert. – MALAYSIA, Sabah: 16 km NE Tenom Agr. Res. Station, 115°59'E, 5°11'N, TL, 180m, 11. VI. 1986, leg. J. Huisman, 2♂ 2♀ (1♂ brach.); same 23. XI. 1987, leg. J. Huisman & R. de Jong, 1♂; Kinabalu Park HQ, roadside, ML, 116°32'E, 6°00'N, 1500m, 14. V. 1987A, 1♀; leg. J. Huisman (all RMNH).

Distribution. – Widespread: India (except the NE), Indochina, extreme S of China including Hong Kong and Taiwan, Ryu Kyu Is., Philippines, Sumatra and N Borneo (Andersen 1975).

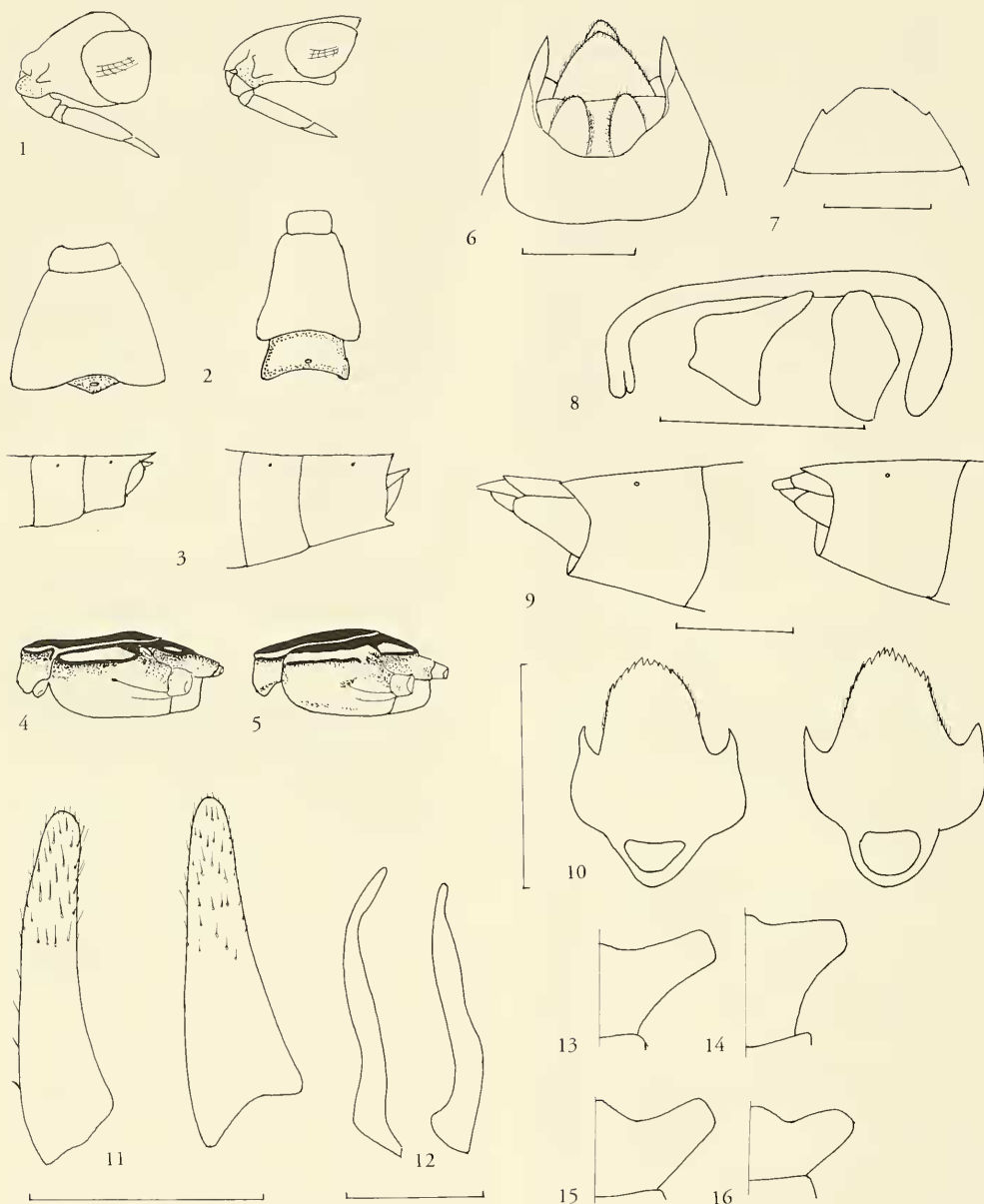
Remarks. – One of the very few species of tropical Asian Gerridae of which the biology has been studied (Cheng 1966, Selvanayagam & Rao 1989, Rubia & Heong 1990). Chinese texts report that it is useful as a component of a cure against malaria (Anonymous 1982).

Limnogonus fossarum skusei (Bueno) (figs. 3-4)

Limnometra skusei Bueno, 1926: 129 (new name for *Hydrometra australis* Skuse, preoccupied by *Hydrometra australis* Say).

Limnogonus fossarum; Lundblad 1933: 374-380, fig. 119 (redescription based on specimens from Java).

Limnogonus fossarum skusei; Andersen 1975: 36-39, figs. 54, 71, 74-77, 86-89, 91-92 (subspective status).



Figs. 1-16. - 1, diagram of head of Gerridae, left *Rhagadotarsus* right *Cylindrostethus*, stippled area is the ventral lobe; 2, diagram of thoracic sternites in Gerridae, left Halobatinae, right Gerrinae, sclerite with stippled margin is metasternum with scent gland orifice; 3, apex of abdomen in female *Limnogonus*, left *L. nitidus*, right *L. fossarum*; 4, lateral view of thoracal pattern in *Limnogonus fossarum skusei*; 5, idem, *L. hungerfordi*; 6, *Tenagogonus akantinos* sp. n., holotype ♂, apex of abdomen ventral view, scale 0.5 mm; 7, idem, allotype ♀, apex of abdomen ventral view, scale 1 mm; 8, idem, lateral view of endosomal sclerites of paratype, scale 0.25 mm; 9-12, *Cylindrostethus*, left *C. brachyakanthinos* sp. n., right *C. persephone* Kirk; 9, apex of abdomen of ♀, scale 1 mm; 10, suranal plate of ♂, scale 1 mm; 11, paramere, scale 0.2 mm; 12, lateral sclerite of endosoma, scale 0.2 mm; 13, left half of suranal plate of *Ptilomera oribasis* Bred. ♂, scale 1 mm; 14, idem, *P. laelaps* Bred.; 15, idem, *P. dorceus* Bred.; 16, idem, unnamed new species.

Material. – Sulawesi Utara: Dumoga Bone National Park, Toraut, Fischteich stüdl. Base Camp, 18. X. 1985, 1♂ 1♀; Danau Alea, Bergsee bei Kotamobagu, 1500m, X. 1985, 1♀; S. Coast, Malibagu, mangrove, 8. XI. 1985, 2♂ 3♀ (no eggs). Sulawesi Tenggara: Desa Kagunyal, N8908, 1♀; Aopa Marsh, N8913, 4♂ 5♀ (3♂ 5♀ apterous); Jalan Asera, N8918 1♂ 1♀; Sungai Kolaka N8921B, 2♂ 2♀; Tamborasi, N8925, 4♂ 6♀ (on the sea, without eggs); Mowewe, N8924, 1♀; Pomalaa, N8930 1♀, N8931 3♀ (2 apt.); Teluk Kendari, N8948, 4♂ 6♀. Buton: Desa Gareng-Gareng, N8937, 1♂ 2♀ (1♀ apt.). West Flores: 1♀, leg. F. A. F. Verheijen (RMNH). Macropterous unless otherwise indicated.

Distribution. – Widespread: Indonesia (except Sumatera), Mariana Is., New Guinea, N and E Australia to Cook Is.

Limnogonus hungerfordi Andersen
(fig. 5)

Limnogonus hungerfordi Andersen, 1975: 46-47, figs. 115, 116, 120-122.

Material. – INDONESIA. Sulawesi Utara: 50 km N Kotamobagu, Thermalquellen, 26. X. 1985, 1♀, leg. G. Zimmermann. Sulawesi Tengah: Palu 60 km SE of: Lore Lindu N. P., Danau Taming and brooklets, UTM SJ95, 1600m asl, *Pandanus*, 7. XII. 1985, 1♂, leg. J. van Tol. Sulawesi Tenggara: Wawonggole, N8901, 6♂ 7♀ (3♂ 2♀ apterous), N8902, 1♀ apt.; Kendari, N8903A, 1♀ apt., 1♀ macr.; Desa Kagunyal, N8905, 1♂ 1♀; N8907, 1♂; Sungai Sampara, N8910, 3♂ 2♀ (1♂ apt.), N8911, 1♂ 1♀, N8912, 2♂ 4♀; Jalan Asera, N8916, 2♂ 3♀, N8917, 5♂ 8♀, N8918, 23♂ 16♀ (2♂ apt.); Pomalaa, N8928 5♂ 2♀ (4♂ 2♀ apt.), N8929 5♂ 4♀ (apt.); Mowewe, N8932, 4♂ 5♀ (3♂ 1♀ apt.), Teluk Kendari, N8945, 1♂. P. Buton: Desa Gareng-Gareng, N8937 1♀; Mangrove swamp, N8939, 1♂ 1♀ apt.; N8943, 1♂ 1♀. Irian Jaya: Neth. New Guinea Exp., Star Range, Bibil, 1290m, 2♀ (RMNH). – MALAYSIA: Sabah: 60 km W Lahad Datu, DVFC, building site staff quarters, ML-light, 117°48'E 4°58'N, 150m, ML-light, 28. X. 1987, 1♂; 23 km W Sandakan, Sepilok tree tower, 118°06'E 5°49'N, 0-100m, ML, 1. XI. 1987, 1♀; 20 km W Sandakan, Sepilok-laut, nr. Resthouse, 118°06'E 5°49'N, 0m, ML-light, 4. XI. 1987, 1♀; 23 km W Sandakan, Sepilok, 118°06'E 5°49'N, 0-100m, ML-light, 31. IX. 1987, 1♂; 12.5 KM S Nabawan, Kg. Pamuntaria, nr river, 116°27'E 5°02'N, 400m, ML-light, 16. XI. 1987, 1♂, leg. J. Huisman & R. de Jong (RMNH). Macropterous unless otherwise indicated.

Distribution. – Widespread: Taiwan, Malay Peninsula, Philippines, Indonesia to New Guinea and NE Australia (Andersen 1975).

Limnogonus nitidus (Mayr)
(fig. 3)

Hydrometra nitidus Mayr, 1865: 443.

Limnogonus nitidus, Lundblad 1933: 387-388, fig. 122 (re-description); Andersen 1975: 62-65, figs. 191, 192, 195-203, 205-208; Selvanayagam & Rao 1989: 474-484 (bio-

logy); Nieser & Chen 1992b: (in print).

Material. – INDONESIA. Sulawesi Utara: Dumoga Bone N. P., Toraut alt. 210m, sec. growth, at light, 28. VIII. 1985, 1♂ 1♀, leg. J. Huijbregts; S coast, Malibagu, Mangrove, 8. XI. 1985, 1♂ 2♀ (no eggs). Sulawesi Tengah: Palu, 65 km SSE of: Lore Lindu N. P., Marena shelter, UTM-SJ62, 600m, 15. XII. 1985, 2♀, leg. van Tol & Krieken (RMNH). Sulawesi Tenggara: Wawonggole, N8901, 1♂; Sungai Sampara, N8912, 1♀; Jalan Asera, N8916 1♂; N8917, 2♂; N8918, 1♂ 4♀; Sungai Kolaka, N8921B, 2♂ 3♀; Tamborasi, N8925 (on the sea), 3♂ 4♀ (3♀ without eggs); Wolo, N8926 (pools on banks), 1♂ 1♀; Pomalaa, N8927, 1♂ (apterous) 1♀; N8930, 1♀; N8931, 1♀. P. Buton: Desa Gareng-Gareng, N8936, 1♀. – MALAYSIA: Sabah, 16 km NE Tenom, Agr. Res. Station, 115°59'E 5°11'N, 180m; TL; 11. VI. 1986, 1♀, J. Huisman. Macropterous unless otherwise indicated.

Distribution. – Widespread: Maldive Is., India, Indochina, Indonesia to Sulawesi, Sumbawa and Flores.

Neogerris Matsumura, 1913

A tropicopolitan genus which until recently was usually treated as a subgenus of *Limnogonus*, with which it deals habitat preference. A revision of Old World species is given in Andersen (1975). Only one species occurs in Sulawesi.

Neogerris parvula (Stål)

Gerris parvula Stål, 1859: 265.

Limnogonus parvulus, Lundblad 1933: 384-387, fig. 121, pl. 11 (redescription).

Neogerris parvula, Andersen 1975: 86-89, figs. 288, 289, 292, 297, 298, 300, 302-306, 309-312.

Material. – Sulawesi Tenggara: Wawonggole, N8901, 1♀, N8902, 3♂ 1♀ (2♂ apterous); Desa Kagunyal, N8905, 1♀; N8906, 2♂ 1♀ (1♂ apt.), N8907, 2♂ 2♀ apt., N8908, 1♀; Sungai Sampara, N8912, 1♂; Aopa marsh, N8913, 5♂ 2♀ (5♂ 1♀ apt.); Jalan Asera, 1♂ 1♀, N8918, 14♂ 14♀ (2♂ apt.); Tamborasi, N8925, 1♀ (on the sea); Pomalaa, N8927 1♀ apt., N8929, 1♂ 1♀ (apt.), N8931, 1♂ 3♀ (2♀ apt.), 1 lv V. – Maluku: Bacan, Wayauna, alt. ca. 50m, sec. growth, eutrophic pool, 06-07. VII. 1985, 1♀. Macropterous unless otherwise indicated.

Distribution. – Widespread: SE tip of Arabian Peninsula, SE Iran, India Indochina, Macao, Amoy, Taiwan, Ryu Kyu Is., Philippines, Indonesia, New Guinea and Solomon Is.

Aquarius Schellenberg, 1800

This genus is not represented in Sulawesi. The nearest localities where species have been encountered are Sumatera and West Australia (Andersen 1990).

Limnometra Mayr, 1865

The Indo-Australian species of this genus have been reviewed recently (Nieser & Chen 1992a). This is essentially a SE Asian and Australian genus with thirty known species of which seven occur in Sulawesi and one on Buton. Sulawesi is the region richest in species for this genus. For a key to the species and other details readers are referred to Nieser & Chen (1992a).

Tenagogonus Stål, 1853

This genus is represented in Africa, Myanma and Sumatera through Indonesia and the Philippines to New Guinea. Not recorded from Sulawesi.

Tenagogonus akanthinos sp. n.

(figs. 6-8)

Type material. - Holotype ♂, allotype ♀, 4 paratype ♂: E. Malaysia, Sabah, Danum Valley, 70 km W Lahad Datu, Main Trail West 5 South 3, 150 m, narrow creeks in rainforest, 16. XII. 1989, sample Sab. 70, M. J. & J. P. Duffels, all apterous (ZMA, 2 paratypes NC).

Description

Apterous specimens. - Dimensions. Length ♂ 6.0-7.6, ♀ 6.8; width of head ♂ 1.23-1.50, ♀ 1.41; width of thorax ♂ 2.22-2.95, ♀ 2.80. Colour. Pale brown, legs medium brown, antennae dark brown. Eyes and apical segment of rostrum shiny dark castaneous. Interoculus with dark brown V-shaped median mark and margins along eyes. Pronotal lobe with blackish margin all around and a dark median longitudinal stripe. Pleura with a dorsal blackish band which is very broad and anteriorly divided in an upper and lower part by a narrow light line on mesopleuron. Ocellated spot dorsally in front of mesoacetabula, dorsal edge of connexiva and lateral margins of abdominal tergites dark brown to blackish. Venter with mesoacetabular suture and patch anteriorly black. Some variable and often ill defined brownish marks on meso- and meta- sternum and first abdominal sternum. Sometimes somewhat similar to the pattern in *T. maai* Hungerford & Matsuda.

Length of antennal segments I : II : III : IV male 2.1 : 1.7 : 2.4 : 2.8; female 1.9 : 1.3 : 1.9 : 2.5.

Rostrum moderately slender, reaching slightly over one third of mesosternum. Posterior lobe of pronotum rather narrow and exposing small parts of mesonotum around its tip. Connexiva rather broad, no connexival spines. Last abdominal segment, however, with a pair of dorsocaudolateral projections, better developed in male than in female, which look like connexival spines. Hind coxae reaching halfway fourth abdominal sternite in male, reaching third in female. Last abdominal sternite as long as three prece-

ding ones. In male last sternite with genital segments as long as preceding part of abdominal venter. Leg measurements, see table 1.

Male first genital sternite with a mediocaudal groove bordered by a pair of broad caudally slightly diverging carinae (fig. 6). Ninth segment without obvious hair tufts. Endosomal sclerites as in fig. 8.

Female, caudal margin of last abdominal sternite with small lateral spines and a short, broad median lobe (fig. 7).

Comparative notes. - At first sight very similar to *T. pravipes* Bergroth (= *Limnometra brevis* Lundblad, = *T. robustus* Hungerford & Matsuda, see Polhemus 1991), which lacks, however, the spine like projections caudally on segment 7 and differs in details of genital segments. *T. kampspe* Kirkaldy which has caudal projections on 7th segment in male, has these placed more ventrally, has a different colour pattern, and different genital segments. *T. maai* Hungerford & Matsuda (= *T. quinque maculata* Miyamoto) (see Polhemus 1991), which may look similar and occurs in the same region, is smaller (♂ length 5.5 mm, width of thorax 1.64), more slender (over three times as long as wide) and has more pronounced spine-like projections of the last abdominal segment.

Etymology. - Akanthinos (Greek adjective meaning spinose) refers to the spine like projections of seventh abdominal segment, which differentiate this species from *T. robustus*.

CYLINDROSTETHINAE Andersen, 1975

Cylindrostethus Mayr, 1865

A tropicopolitan genus, the species live mostly on shaded, quiet parts of streams, like most representatives of the genus *Aquarius*. At first sight, species of both genera are quite similar in size and general shape. Two species have been found in Sulawesi. The comparative notes under *C. brachyakanthinos* sp. n. will serve to separate them.

Cylindrostethus persephone Kirkaldy

Cylindrostethus persephone Kirkaldy, 1899: 508; Hungerford & Matsuda 1962: 97-99, pl. 3 figs. E, F, pl. 5 figs. h, i (redescription).

Material. - Sulawesi Utara: Dumoga Bone National Park, Tumpah river nr. confl. Toraut, UTM XL0063, c. 210 m als., 18. V. 1985-A, 2♂ 1♀ (1 copula); same 23. V. 1985-A, 1♂ 2♀ (1 copula); same 3. VI. 1985-A 2♂ 3♀ 3 lrv, leg. J. van Tol. Dumoga Bone N. P. Tumpah R. Staustufe, 13. X. 1985, 3♂ 3♀; Tumpah R., Sandinsel u Stromschnelle, 19. X. 1985, 4♂ 3♀; Dumoga R. 22. X. 1985, 2♂ 2♀, leg. G. Zimmermann; Str. nach Malibogu, Bach, 18. XI. 1985, 3♂ 3♀ leg. G. Zimmermann. - Sulawesi Tengah: Palu, gardens and agricultural fields, 28.

XI. 1985-A, 1♂ 1♀, leg. J. van Tol. – Sulawesi Tenggara: Sungai Sampara, N8911, 12♂ 13♀. All apterous.

Distribution. – Sulawesi.

Cylindrostethus brachyakanthinus sp. n.
(figs. 9-12)

Type material. – Holotype ♂, allotype ♀, 14 paratypes ♂, 15 paratypes ♀, Sulawesi Tengah, Luwuk area, Sungai Batui, 15 Nov 1989, J. van Tol (RMNH). Additional paratypes (larvae excluded): Luwuk area, S. Batui, 17 Nov. 1989, 36♂ 18♀; Luwuk area, Sungai Biak, 21. X. 1989, 9♂ 8♀; NE Luwuk, 24. I. 1989, 9♂ 3♀, J. van Tol (RMNH). NE Luwuk, Sungai Bantayan, near road Kayutanyo-Siuna, (0°47'S 123°00'E), 50-100m, medium sized river in slightly disturbed lowland rainforest, sta. Sul 2, 7. Oct 1989, 18♂ 12♀ 1 lv; SW Luwuk, between Desa Seseba and Singing Camp (ca 1°09'S 122°31'E), 80m, narrow stream in lowland rainforest, sta. Sul12, 4 Oct 1989, 5♂ 5♀ 1 lv; SW Luwuk, Sungai Batui at Singing Camp (ca 1°09'S 122°31'E), 90m, middle sized stream in lowland rainforest, sta. Sul14, 14 Oct 1989, 4♂ 5♀ 13 lv; SW Luwuk, Totop Camp along Sungai Batui (1°09'S 122°31'30"E), 120m, lowland rainforest, sta. Sul18, 19/21 Oct 1989, 13♂ 20♀ (1 ♀ macropterous) 25 lv, leg. J. P. Duffels (ZMA). Apterous unless otherwise indicated.

Description

Apterous specimens. - Dimensions. Length ♂ 10.9-11.7, ♀ 13.9-15.2; width of head ♂ 1.60-1.64, ♀ 1.80-1.89; width of thorax ♂ 2.50-2.54, ♀ 3.24-3.48. Colour and pilosity. Dorsally generally black with conspicuous stripes of silvery hairs at dorsal margins of pleura and ditto dots on acetabula. Median band dorsally on head, thorax and abdomen glabrous in spite of short golden pubescence especially on abdominal tergites. Apex of head with dirty yellowish pilosity at sides, becoming blackish with sparse lighter hairs posteriorly. Fulvous spot on base of head and narrow median fulvous stripe on pronotum rather indistinct. Lateral margins of mesonotum broadly with short thick velvety black pilosity. Outer (upper) margin of connexiva fulvous. Anterior femur black with yellowish base and variable yellowish stripes on inner and outer faces, tibia and tarsus blackish. Middle and hind legs blackish except for coxae and trochanters mainly yellowish. Venter with silvery pilosity on dark base in males; background except for dark spots anreriorly on thorax, yellowish in females.

Length of antennal segments I : II : III : IV, male 1.8 : 1.1 : 0.6 : 0.95, female 2.1 : 1.15 : 0.6 : 1.0. In dorsal view head longer than pronotum (1.2 in males, 1.4 in females). Pronotum medially depressed. Mesonotum not depressed but with a very thin median groove over its length in female, only in posterior part in males. Caudal part of mesonotum in female without oblique ridge. Metanotum flat, its rear margin sinuate. Connexiva slightly less than half the

width of tergites, flaring laterally in males, more or less erect in females (except when abdomen swollen with eggs). Connexival spines short, reaching halfway first genital segment in both sexes, tips not or hardly divergent caudally. Metasternum with lateral groove leading from omphalium, deep and well marked, much more prominent than caudal margin of metasternum, which is subequal to or slightly longer than median length of first two abdominal sternites combined. Leg measurements, see table 1.

Male. Suranal plate in male as shown in fig. 10; wings convex lateroproximally. Last two abdominal sternites of subequal median length, posterior margin of last abdominal sternite evenly concave, posterior margin of first genital sternite slightly produced to nearly straight medially, their median length subequal. Parameres and lateral sclerite of endosoma as in figs. 11, 12.

Female. Last abdominal sternite medially slightly longer than penultimate, its hind margin slightly and obtusely produced medially. Macropterous female (apex of hemielytra broken off) as apterous except for development of pronotum and wings. Length 14.5, humeral width of pronotum 2.35, thoracic width 3.25. Hemielytra dark brown with blackish veins.

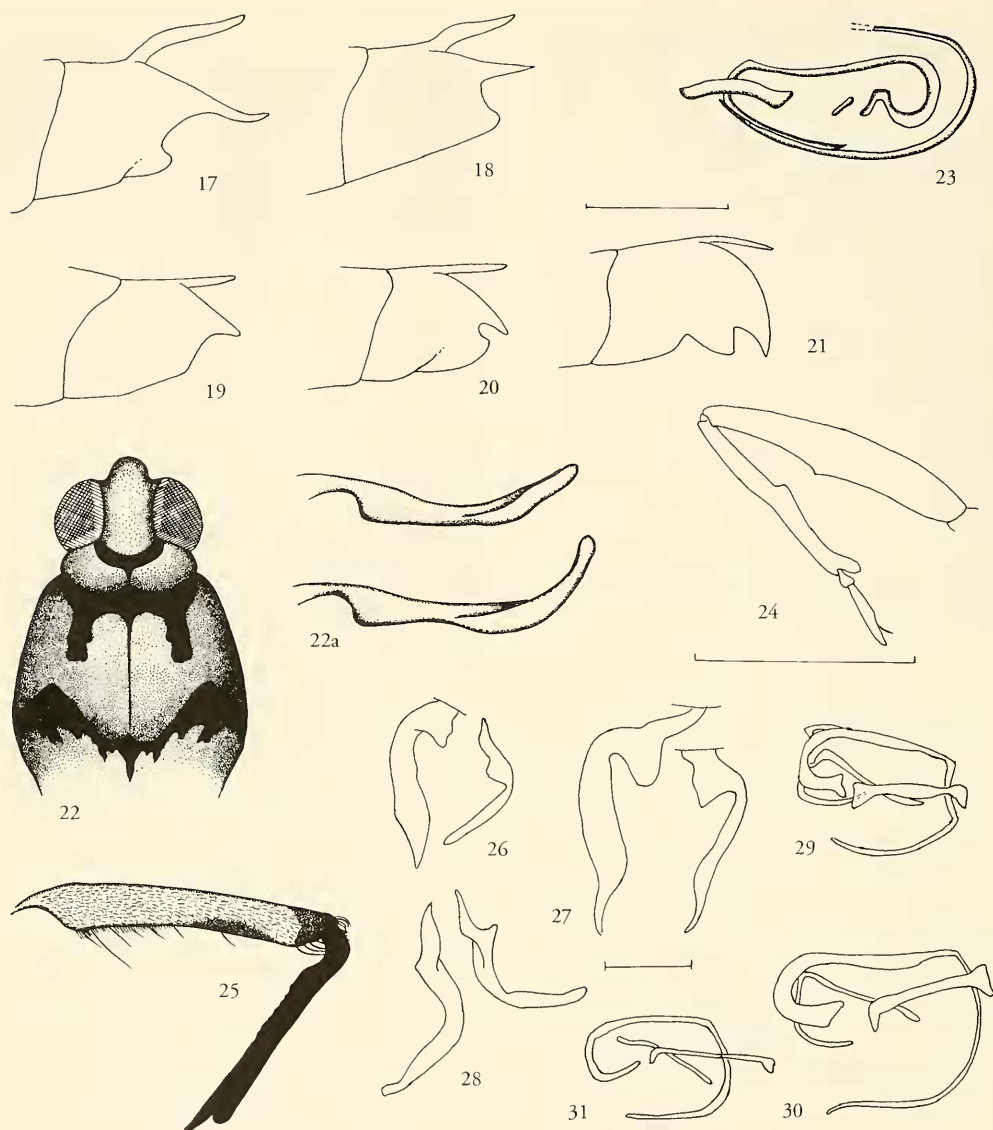
Comparative notes. – Very similar to *Cylindrostethus persephone* Kirk., also from Sulawesi. There is a series of small differences: *C. brachyakanthinus* is slightly larger on average, the fulvous marks on head and pronotum are less distinct, the male abdomen is darker, the posterior part of mesonotum in female is not differentiated. The connexival spines in *C. brachyakanthinus* are shorter (fig. 9), the wings of the suranal plate of male are convex basally (straight in *C. persephone*, fig. 10) and the paramere is broader at base and consequently more tapering in *C. brachyakanthinus* (fig. 11). The endosomal sclerites are nearly identical, only the laterals show very small differences in shape (fig. 12).

Etymology. – *Brachyakanthinus* (Greek adjective meaning 'with short spines') refers to the short connexival spines.

EOTRECHINAE Matsuda, 1980

No species of this subfamily have been reported from Sulawesi. Members of this subfamily live rather cryptically on wet places along waters. If any are to be found they will most likely belong to the widespread genus *Amemboa* Esaki, of which species have been recorded from Java and Mindanao (Polhemus & Andersen 1984).

RHAGADOTARSINAE Lundblad, 1933



Figs. 17-31. – 17, lateral view (left) of seventh abdominal segment of *Ptilomera doreceus* Bred., ♀, scale 2 mm; 18, idem, *P. oribasus* Bred.; 19, idem, *P. laelaps* Bred.; 20, idem, unnamed new species; 21, idem, *P. sumizone* Esk. (redrawn after Hungerford & Matsuda 1965); 22, *Metrocoris breviculus* sp. n., holotype, scale 0.5 mm, paramere; 23, idem, endosomal sclerites, lateral view; 24, forelegs of male *Ventidius kurtakalami* sp. n. paratype (Halobatinae), scale 1 mm; 25, idem, *Metrocoris breviculus* sp. n., holotype; 26, Parameres of *Ventidius xiphibion* sp. n., scale 0.25 mm; 27, idem, *V. xyle* sp. n.; 28, idem, *V. kurtakalami* sp. n.; 29, lateral view of endosomal sclerites of *Ventidius xiphibion* sp. n., scale 0.25 mm; 30, idem, *V. xyle* sp. n.; 31, idem, *V. kurtakalami* sp. n.

Rhagadotarsus Breddin, 1905

A small tropical genus with one species in Asia, which is also known from Sulawesi, and one (attributed to a different subgenus) in Africa.

Rhagadotarsus kraepelini Breddin

Rhagadotarsus kraepelini Breddin, 1905: 136-139, figs. 12-14; Lundblad 1933: 412-415, fig. 132, pl. 11; Cheng & Fernando 1969: 128-129, figs. 292-306.

Sulawesi Tenggara: Wawonggole, N8901, 1♂ 1♀; Sungai Sampara, N8909 4♂ 7♀ (2♀ mact.). Apterous unless otherwise indicated.

A very widespread species, from Sri Lanka, Myanmar and SW China to Philippines, Sulawesi and Sumbawa.

PTILOMERINAE Esaki, 1927

Ptilomera Amyot & Serville, 1843

Widely distributed in tropical Asia. Large and conspicuous inhabitants of streams usually near places with rather strong current on which they venture when disturbed. Regularly on very narrow streams. In spite of their size and obvious morphological specialization identification is difficult as there are several species groups consisting of very similar species. At present the genus is under revision by D. A. Polhemus (Bishop Museum, Honolulu, Hawaii); material of our expeditions will be included in Polhemus' study. We present a preliminary key to Sulawesi species (Polhemus & Polhemus 1986).

Key to *Ptilomera* of Sulawesi

1. Specimens with posterior sclerite in dorsal view (suranal plate) with a pair of lateral wings, a pair of caudally directed more or less curved styli (which are actually the parameres) and in ventral view a large boat-shaped posterior segment (the pygophore) with a pair of lateral extensions, males 2
- Apex of abdomen in lateral view with a broad lateral plate on last segment which hides the apex of abdomen, females 7
2. Lateral wings of suranal plate with rostral and caudal margins nearly parallel in apical part (fig. 13) [Sulawesi Selatan & Tengah] *P. oribasus* Breddin, 1901
- Rostral and caudal margins of lateral wings of suranal plate convergent lateroapically 3
3. Lateral wings of pygofer long and slender, apically acutely pointed and laterally surpassing the wings of suranal plate [Sulawesi Tengah] *P. pamphagus* Breddin, 1901
- Lateral wings of pygofer shorter, laterally at most as long as the wings of suranal plate or with broadly truncate apex 4
4. Caudal margins of lateral wings of suranal plate perpendicular on longitudinal body axis (fig. 14) 5
- Caudal margins of lateral wings of suranal plate pointing obliquely caudad compared to longitudinal body axis 6
5. First genital segment strongly swollen dorsally in caudal half [Sulawesi Tenggara]

- *P. sumizone* Esaki, 1925
- First genital segment not swollen dorsally [Sulawesi Selatan] *P. laelaps* Breddin, 1901
6. Caudal margins of lateral wings of suranal plate nearly straight (fig. 14) [Sulawesi Utara]
- *P. dorceus* Breddin, 1901
- Caudal margins of lateral wings of suranal plate convex (fig. 15) [Sulawesi Tenggara]
- *Ptilomera* sp. n.
7. Dorsal lobe of seventh abdominal segment (lateral view) long and spine-like, reaching beyond well developed connexival spines (fig. 17) . *P. dorceus*
- Dorsal lobe relatively shorter 8
8. Dorsal lobe well developed and narrow, reaching to apex of connexival spines (fig. 18) *P. oribasus*
- Dorsal lobe broader 9
9. Incision between dorsal and ventral lobe of seventh abdominal segment in lateral view wide, ventral lobe reduced (fig. 19) *P. laelaps*
- Incision narrow, ventral lobe more distinct ... 10
10. Caudal margin of dorsal lobe of seventh abdominal segment vertical 11
- Caudal margin of dorsal lobe of seventh abdominal segment pointing obliquely caudad (fig. 20) *Ptilomera* sp. n.
11. Lateral lobe of seventh abdominal segment ventrobasally with an incision (fig. 21) .. *P. sumizone*
- Lateral lobe of seventh abdominal segment ventrobasally without an incision *P. pamphagus*

Pleciobates Esaki, 1930

One species known from the Malay Peninsula, *P. tuberculatus* Esaki, 1930.

Rheumatogonus Kirkaldy, 1909

Three species, of which *R. intermedius* Hungerford, was described from Sumatera and occurs in the Malay Peninsula too (Cheng & Fernando 1969). The other two occur in the Philippines, one extending into N. Borneo.

Rheumatogonus borneensis Esaki

Rheumatogonus borneensis Esaki, 1927: 267-268, fig. 3d; Andersen 1967: 267-272, figs. 12-14, 16-17 (redescription).

Material. - MALAYSIA, Sabah, Danum Valley, 70 km W Lahad Datu, Main Trail W 12, 180 m, 2. XII. 1989, narrow stream, sample 52, 7♂ 2♀; same, 4 km S main trail W 5, nr. Sungai Segama, 150 m, 3. XII. 1989, middle sized stream and water fall, sample 54, 1♂ 1♀; same, Main Trail West 5 South 3, 150 m, 18. XII. 1989, narrow creeks in rainforest, sample 70, 2♂ 5♀, leg. M. J. & J. P. Duffels (ZMA), all apterous.

Table 1 Measurements of leg segments of Gerridae described in this paper. In species marked with an *, the tarsal segments have not been measured separately, the entire length is given under tars1.

	femur	tibia	tars1	tars2		femur	tibia	tars1	tars2
<i>Cylindrostethus brachyakanthinos</i>									
♂ fore leg	3.1	2.9	0.2	0.6	♀ fore leg	1.17	0.92	0.12	0.60
♂ middle leg	11.1	7.4	3.5	0.8	♀ middle leg	3.17	3.59	1.30	1.25
♂ hind leg	11.4	6.0	0.5	0.3	♀ hind leg	3.05	1.25	0.21	0.37
♀ fore leg	3.6	3.5	0.3	0.65	<i>Tenagogonus akanthinos</i>				
♀ middle leg	12.1	8.5	5.1	1.0	♂ fore leg	3.1	2.55	0.35	0.64
♀ hind leg	12.2	8.9	0.7	0.4	♂ middle leg	8.1	5.6	2.0	0.58
<i>Metrocoris breviculus*</i>					♂ hind leg	7.6	3.2	0.64	0.62
♂ fore leg	2.03	1.68	0.70		♀ fore leg	2.9	2.3	0.3	0.57
♂ middle leg	5.65	3.93	1.82		♀ middle leg	6.5	4.8	2.0	0.60
♂ hind leg	4.79	2.50	0.72		♀ hind leg	6.4	2.9	0.55	0.51
♀ fore leg	1.74	1.43	0.70		<i>Ventidius kurtokalami*</i>				
♀ middle leg	4.80	3.48	1.70		♂ fore leg	1.2	1.0	0.40	
♀ hind leg	4.20	2.42	0.71		♂ middle leg	3.3	1.8	1.1	
<i>Potamometropsis anomalis</i>					♂ hind leg	3.6	1.5	0.5	
♂ fore leg	5.1	4.0	1.9	0.85	♀ fore leg	1.6	1.0	0.5	
♂ middle leg	13.2	7.1	3.0	0.47	♀ middle leg	3.6	1.8	1.1	
♂ hind leg	13.2	4.6	0.10	0.12	♀ hind leg	4.0	1.7	0.6	
♀ foreleg	5.1	3.9	2.1	0.98	<i>Ventidius xiphibion*</i>				
♀ middle leg	12.9	7.2	3.1	0.50	♂ fore leg	1.1	0.9	0.35	
♀ hind leg	13.2	5.0	0.10	0.13	♂ middle leg	3.2	1.9	1.1	
<i>Rheumatometroides drepanephoros</i>					♂ hind leg	3.5	1.5	0.4	
♂ fore leg	0.85	0.7	0.09	0.36	♀ fore leg	1.2	0.9	0.3	
♂ middle leg	2.12	2.59	0.79	0.77	♀ middle leg	3.3	1.9	1.1	
♂ hind leg	2.24	0.80	0.11	0.27	♀ hind leg	3.7	1.6	0.4	
♀ fore leg	0.85	0.74	0.09	0.38	<i>Ventidius xyle*</i>				
♀ middle leg	2.18	2.59	0.81	0.79	♂ fore leg	1.2	1.0	0.4	
♀ hind leg	2.30	0.88	0.12	0.31	♂ middle leg	3.4	1.9	1.1	
<i>Rheumatometroides makraitos</i>					♂ hind leg	3.9	1.7	0.5	
♂ fore leg	1.15	0.96	0.1	0.5	♀ fore leg	1.2	1.0	0.4	
♂ middle leg	2.82	3.26	1.18	1.08	♀ middle leg	3.5	1.9	1.1	
♂ hind leg	3.01	1.16	0.19	0.38	♀ hind leg	3.9	1.8	0.5	

Potamometropsis Lundblad, 1933

Three species, one from Sumatera and two from the Philippines are known (Hungerford 1957). We add a new species from North Sulawesi.

Potamometropsis anomalis sp. n. (figs. 38-41)

Type material. - Holotype ♂ allotype ♀ (ZMA), 1♂ 8♀ paratypes (1♀ macropterous): Sulawesi Utara, Dumoga Bone N. P., Tumpah R. Staustufe (barrage), 23 Oct. 1985, leg. G. Zimmermann (1♀ MBBJ, 1♂ 3♀ NC, 1♀ RMNH, 4♀ ZC). - Additional paratypes: Sulawesi Utara, Dumoga Bone N. P., Base Camp, bridge, 16. X. 1985, leg. G. Zimmermann, 3♂ 4♀ (1♂ 2♀ macropterous) (NC, ZC); Tumpah River, beach, 19. X. 1985, 1♀, leg. G. Zimmermann same, Edwards Camp, Tumpah River, 900m, 23.II.1985, Stat. 28 (Project Wallace), 1♂ leg. J. P. Duffels (ZMA), apterous unless otherwise indicated.

Description

Apterous specimens. - Dimensions. Length ♂ 7.8-8.4, ♀ 9.4-10.3; width of head ♂ 1.41-1.45, ♀ 1.41-1.48; thoracic width ♂ 2.46-2.50, ♀ 2.90-3.05.

Colour black. Head yellowish brown with a large

median blackish spot anteriorly and a pair of smaller blackish spots in posterior part of interoculus. Venter of head, rostrum except for apex, prosternum, posterior half of mesosternum, metasternum, abdominal venter, acetabula, coxae and ventral and dorsal stripe apically and proximally widened on fore femur, yellow. Antennae and legs dark castaneous. Mesosternum, metasternum and abdominal venter with dense short silvery pilosity. A broad band of silvery pilosity on upper part of mesothoracic pleuron extending on dorsum of metaacetabulum. A pair of submedian bands of silvery pilosity on pro- and mesonotum, in some specimens hardly developed. A band of silvery pilosity just ventrally and just dorsally of base of connexiva.

Length of antennal segments I : II : III : IV ♂ 3.51 : 1.43 : 1.23 : 1.09, ♀ 3.67 : 1.33 : 1.22 : 1.11. So second segment longer than third. Pronotum slightly wider than head, median length 0.8. Median length of mesonotum three times as long as pronotum and metanotum. Fore tibia laterally compressed, with a slight constriction subapically, accentuated by tufts of

setae proximally and distally of constriction. Inner apical process bluntly triangular, equally developed in both sexes. First segment of fore tarsus slightly over two times as long as second (table 1). Middle and hind femur of subequal length in both sexes sometimes middle > hind, sometimes the reverse. Leg measurements, see table 1.

Male. Tergite 7 two times as long as tergite 6, sternite 7 caudally broadly and shallowly emarginate. Tergite 8 twice as long as sternite, caudally broadly rounded. Paramere, well developed, rather broad compared to other species in the genus (fig. 40), in rest hidden in the prominent pygophore. Endosoma, fig. 41.

Female. Tergite 7 nearly two times as long as 6. Sternite 7 twice as long as 6, with a broad medio-caudal lobe, in ventral view covering most of the genital segments (fig. 39).

Macropterous form as apterous except for development of thorax and pronotum. Length (including hemielytra) 10.0-10.2, humeral width of pronotum 2.4-2.5. Pronotum mostly shining black with rough impressed punctures, median length 2.9. Anterior lobe divided from posterior lobe by a medially interrupted ridge caudally accentuated by a groove with some silvery pilosity, posterior part of anterior lobe and anterior part of posterior lobe with a median longitudinal carina. Hemielytra rather membranous, medium brown with swollen, slightly darker, veins.

Etyymology. – *Anomalos*, a greek adjective meaning aberrant.

Comparative notes. – *P. anomalis* differs from other species in the genus by having second antennal segment longer than third and first segment of fore tarsus over twice as long as second. The male has a shorter and broader paramere than other species, the abdominal sternite 7 of the female is quite different from the other species.

Remarks. – The macropterous female from 'Staustufe' has the hemielytra broken off which seems to be the normal condition in this genus (Hungerford 1957). The macropterous specimens from 'bridge' have the hemielytra complete, these are recently moulted specimens, with belly still soft (bending inward under slight pressure). Its general form, absence of specialization of the venter in female and presence of claws on middle and hind tarsi place this species in *Potamometropsis*. This species differs in several characters from all its congeners (see comparative notes). Pending a cladistic analysis of the entire subfamily we refrained from describing a new genus for it.

We have seen a teneral female from Sabah, Kg. Sapulut, 116°36'E 4°38'N, leg. Huisman in RMNH, which might belong to another species of this genus but as the abdomen is shrivelled, this material is insufficient for a description.

HALOBATINAE Bianchi 1896

Halobates Eschscholtz, 1822

Exclusively marine. Several species live on the open ocean, have wide distributions and are only found near or even on the shore after high winds. *Halobates micans* Eschscholtz is tropicopolitan and the only species found in the open Atlantic. It has been recorded from Laut Sulawesi. A second species has been recorded from the same area: *Halobates germanus* White (Herring 1958). These species are easily separated by size, *H. micans* is over 4-4.5 mm long, *H. germanus* 3.5-3.9 mm. We have seen two specimens of the largest species in the genus *H. princeps* which measures 6-7 mm. So far this is the only species recorded from the coast of Sulawesi (Andersen 1991b). The genus was revised by Herring (1961); a survey of phylogeny and evolution is given by Andersen (1991a).

Halobates princeps White

Halobates princeps White, 1883: 44, pl. 1 fig. 3; Herring 1961: 267-270, fig. 70 (redescription); Andersen 1991b: 158, fig. 8.

Material. – Sulawesi Utara, N. Coast, Molosso, reef, rock pools, 16. X. 1985 2♀, leg. G. Zimmermann.

Distribution. – Range included Solomon Isles, N New Guinea, NW Australia, Nusa Tenggara, Malay Peninsula, extreme S of Philippines and Palau (Andersen 1991b). This species has apparently been found on more or less open sea (the type is from 'Celebes Sea') and on coastal habitats.

Metrocoris Mayr, 1865

Widespread, from the Arabian Peninsula to SE Asia. The species from Malay Archipelago and Philippines have recently been revised by Polhemus (1990). The genus as a whole will be revised by Chen & Nieser (in prep.). Two species are known from Sulawesi.

Key to *Metrocoris* from Sulawesi

1. Transverse black band on pronotum covering anterior third to nearly half of pronotum, body length 5-6.3 mm *M. celebensis*
- Transverse black band on pronotum covering less than anterior third of pronotum, body length 4-4.3 mm *M. breviculus*

Metrocoris celebensis D. Polhemus, 1990

Metrocoris celebensis D. Polhemus, 1990: 8-9, figs. 3, 19-22, 47).

Only known by the type series from Lore Lindu National park (Sulawesi Tengah), we have seen 1 ♂ 1 ♀ apterous paratypes in ZMA.

Metrocoris breviculus sp. n.
(figs. 22-23, 25)

Type material. – Holotype ♂, allotype ♀, 1 ♀ paratype: Sulawesi Tengah, between Desa Seseba and Singing Camp, SW of Luwuk, c 1°09'S 122°31'E, 90m, narrow stream in lowland forest, 14. X. 1989, Sta. Sul12, J. P. Duffels. Batui River at Singing Camp, 90m, middle sized stream in lowland rainforest, 14-17. X. 1989, Sul. Sta. 14, J. Duffels 1 ♂ 1 ♀ paratypes, all apterous (ZMA, NC).

Description

Apterous specimens. – Dimensions. Length ♂ 4.3, ♀ 4.0-4.2; width across metaacetabula ♂ 2.2-2.3, ♀ 2.3-2.4; width of head ♂ 1.32-1.33, ♀ 1.29-1.31. Colour. Dark pattern variable, somewhat reduced compared to other species. Interoculus without dark mark or anterior half dark with caudal arms along inner margins of eyes. Dark mark of pronotum T-shaped, dark mark of mesonotum T-shaped with lateral edges of T produced caudally. Metanotum with a broad anterior and mesal band. First abdominal tergite black with a pair of yellowish spots, connexiva anteriorly blackish, posteriorly yellowish, remaining tergites yellowish with blackish margins. Mesopleura yellow without longitudinal dark stripe. Fore femur with an apical dark ring, which may extend over the apical quarter of femur, ventral longitudinal stripe present, other indistinct or absent. Venter yellowish, area around metasternal scent gland opening dark to black in both sexes.

Width of an eye slightly less than its posterior width, 0.42 and 0.46 in ♂, 0.50 and 0.53 in ♀ respectively, width of interoculus 0.48. In lateral view posterior half of eye covering anterior three fifths of propleura. Length of antenna ♂ 4.6, ♀ 3.7. Length of antennal segments I : II : III : IV ♂ 1.92 : 1.11 : 0.91 : 0.60, ♀ 1.51 : 0.79 : 0.81 : 0.60. Antenna in male reaching well beyond the apex of abdomen, in female reaching the apex of abdomen, antenna in male distinctly thicker than in female. Antennal segments II and III in males with curved woolly pilosity, especially developed on ventral face, its thickness over half the width of the segments. Pronotum not bulbous, its width 1.4-1.5, slightly more than width of head. Meso- and metapleura with blackish pilosity which tends to become bristle-like at rear end of metapleura. Male fore femur (fig. 25) not incrassate, ratio length: width about 6, without stiff dark spinules, long hair fringe on inner face, constriction, indentation or tooth; fore tibia without tooth like elevation. Female fore femur, ratio length : width 6-6.5. Length of hind trochanter 0.5 in both sexes, in female with-

out a tuft of long curved hairs apically. Middle and hind femur without long hair fringe. Leg measurements, see table 1.

Male. Pregenital tergite and genital segments rather small, pregenital segment, length 0.2, width 0.5. Parameres, fig. 22, endosomal sclerites fig. 23.

Female. Subgenital sternite large, its median length subequal to the median length of preceding abdominal sternites together, caudal margin sinuate without tongue-like caudal process, apex of abdomen visible in ventral view.

Macropterous form unknown.

Etymology. – *Breviculus* (latin adjective meaning rather small) refers to the small size of the species.

Comparative notes. – Recognized at once by its small size in combination with yellowish venter, absence of mesopleural stripes and the paramere fig. 22. *M. breviculus* is 1 mm or more shorter than the only other species occurring in Sulawesi: *M. celebensis* D. Polhemus.

Esakia Lundblad, 1933

Species of *Esakia* are very similar to *Ventidius* and *Ventidiopsis*. The genus is considered by Matsuda (1960) to have evolved from *Ventidius* by acquiring some specialized characters such as the strongly modified third antenna of the male. Three of the six species known occur in the Malay Peninsula, *E. ventidioides* Lundblad (1933) was described from Sumatera.

Ventidiopsis Miyamoto, 1967

Monotypic; *V. imadatei* Miyamoto (1967) was described from N. Borneo (Brunei).

Ventidius Distant, 1910

The largest and most widespread genus within this group of small Halobatinae, 16 species have been described. Greatest species density seems to be in the Malay Peninsula (Cheng 1965, Lansbury 1990) but various regions of its range have been poorly sampled.

Ventidius xiphibion sp. n.
(figs. 26, 29)

Type material. – Holotype ♂, allotype ♀ (RMNH), 42 ♂ (1 ♂ macropterous) 64 ♀ paratypes: Sulawesi Tenggara, Small stream 8 km E of Sungai Sampara along road Kendari-Wawotobi, N8911, 22 Feb 1989. – Additional paratypes: P. Buton: Stream just N of Bau-bau, N8935, 8 Mar 1989, 35 ♂ 40 ♀ (1 ♀ macr.); stream about 15 km E of Bau-bau, N8942, 10 Mar 1989, 40 ♂ 18 ♀ (1 ♀ macr. teneral). Apterous, unless indicated otherwise. Samples N8935 and N8942 contained also many larvae.

Description

Apterous specimens. Dimensions. Length ♂ 2.7-3.0, ♀ 3.0-3.3, width of thorax ♂ 1.95-2.05, ♀ 2.20-2.32. Colour. Eyes and anterior half of interoculus blackish, posterior half of interoculus yellow. Pronotum black with 5 small yellowish spots: antero-medial, one pair halfway laterally at posterior border and a pair laterally at margins of eyes. These spots are variable, specifically the three central ones may be confluent. meso- and meta- notum with a large central bilobed yellow area (general pattern as in *V. henryi* and *V. werneri* Hungerford & Matsuda, but with light area larger although quite variable between series). A broad black longitudinal band, which may be interrupted in lightly coloured specimens, on border of notum and pleuron. Posterior part of metanotum, first abdominal tergite black, with caudally tapering lateral black bands on remaining abdominal tergites, connexiva from second segment on yellow. Genital segments black in male, laterally and caudally black in female. Variable black dots anteriorly of acetabula. Venter yellow with a pair of small black dots at anterior point of mesoacetabular suture. Apex of rostrum, antennae except for base of first segment, apex of fore femur and rest of fore leg, middle and hind leg blackish. Body dorsally with rather sparse short black pilosity giving the specimens a dull appearance.

Antennae when folded back over venter as long as body in male, slightly shorter in female. Length of antennal segments I : II : III : IV, male 1.22 : 0.48 : 0.34 : 0.46, female 1.23 : 0.48 : 0.44 : 0.50. Eyes twice as long as head, overlapping lateral margin of prothorax and anterolateral angles of mesothorax. Anterior and posterior margins of pronotum medially concave. In lateral view, mesonotum softly convex dorsally, metanotum declivent. Intersegmental suture between meso- and meta- notum as well as anterior margin of first tergite indistinct or lost. Lateral longitudinal suture of metanotum not reaching the level of meso/metanotal intersegmental suture. Posterolateral angle of metaacetabula bilobate. Ventral margin of front femora nearly straight in female; convex, but without tubercle in the middle, in male; ratio length: width 5.7 in male, 6.4 in female. Leg measurements, see table 1.

Male. Parameres asymmetrical, fig. 26. In the centre of mesosternum is a small patch of minute black bristles which are not on a tubercle.

Macropterous form. - As apterous except for development of pronotum and hemielytra. Length ♂ 2.8-3.3, ♀ 3.4-3.6, humeral width of pronotum ♂ 1.65-1.70, ♀ 1.80-1.95. Pronotum black, lateral margin and apex brownish, anterior margin variable from black to a predominantly yellow transverse band; a pair of large pale yellow pear-shaped patches on centre of disc. Hemielytra extending beyond apex of abdomen, black with costal area and inner margin dark brown.

Comparative notes. - The bilobed posterolateral angle of metaacetabula, the sexual dimorphism of fore femur, asymmetrical parameres and small patch of black bristles on mesosternum of male place this species in the subgenus *Ventidoides* Hungerford & Matsuda. *V. xiphibion* differs from *V. pulai* Cheng, which has a very similar colour pattern, apart from being slightly larger on average, by lacking a tubercle on fore femur of male, having the patch of minute black bristles on male mesosternum developed, although not on a tubercle, and different parameres. The macropterous form of *V. pulai* has the light mesonotal spots fused so there is one large central spot. Other Malay species differ in head coloration.

Etymology. - *Xiphibion* (greek: small sword) a noun in apposition refers to the shape of left paramere.

Remarks. - This and the next are the first species of this genus to be reported from Sulawesi. The localities where *V. xiphibion* was taken are small to medium sized streams, all three had turbid water due to suspended loam. The species tends to aggregate at places with little current.

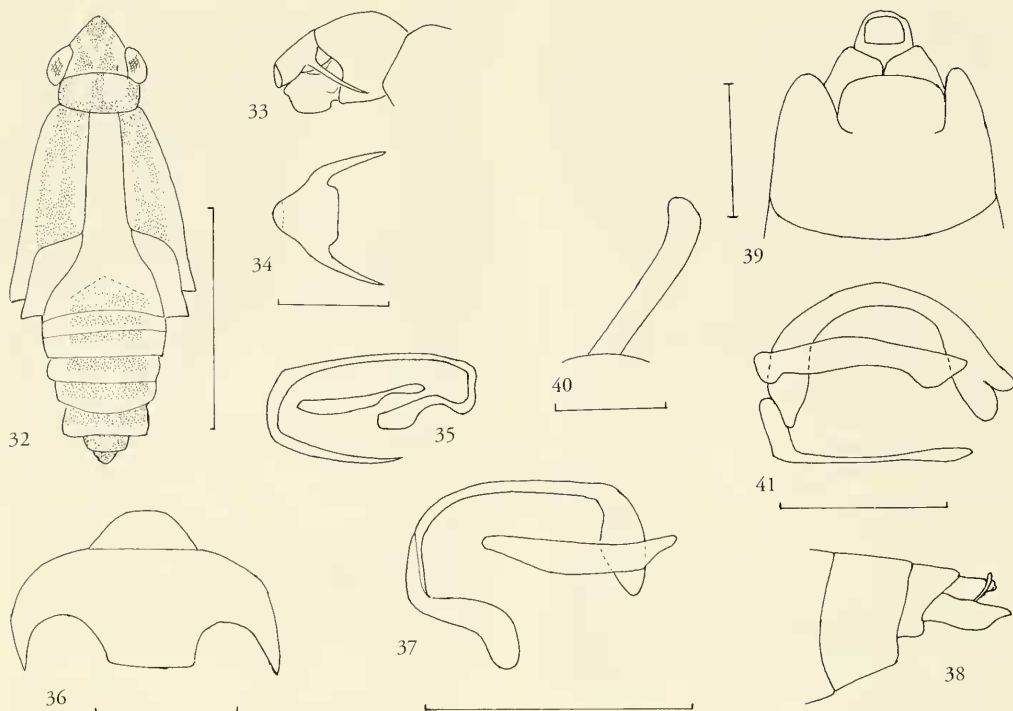
Ventidius xyele sp. n. (figs. 27, 30)

Type material. - Holotype ♂, allotype ♀ (RMNH), Sulawesi Utara, Dumoga Bone National Park, R. Toraur, Maze, 16 Nov. 1985, leg. G. Zimmermann. - Paratypes (the adults only) same data as holotype, 3♂ 9♀; Dumoga Bone N. P. Base Camp, 16. X. 1986, 1♂ 1♀; Dumoga Bone River, downstream of bridge, 22. X. 1985, 1♀; Tumpah River, Beach, 19. X. 1985 8♂ 9♀, 28 lv III-V; Tumpah River, Staustufe (low barrier), 23. X. 7♂ 7♀; Malibagu Z. 8. XI. 1985, 5♂ 1♀ (2♂ 1♀ macropterous); Südküste, Strasse, Bach (S coast, road, rivulet), 18. XI. 1985, 4♂ 5♀ 5 lv IV-V, apterous unless otherwise indicated (ZC, 8♂ 8♀ NC, 1♂ 1♀ each in BPUH, JTPC, MBBJ, PCHC, ZMA, ZMC).

Description

Apterous specimens. - Dimensions. Length ♂ 2.9-3.0, ♀ 3.0-3.2, width of thorax ♂ 2.0-2.12, ♀ 2.20-2.33. Colour, as in *V. xiphibion* except: pronotum without yellow spots, meso/metanotal yellow mark, smaller (but essentially of the same shape), black area on border of notum and pleuron broader and not interrupted.

Antennae when folded back over venter as long as body in male, slightly shorter in female. Length of antennal segments I : II : III : IV, male 1.29 : 0.50 : 0.41 : 0.46, female 1.22 : 0.50 : 0.52 : 0.48. Eyes twice as long as head, overlapping lateral margin of prothorax and anterolateral angles of mesothorax. Anterior and posterior margins of pronotum medially concave. In



Figs. 32-41. – 32, *Rheumatometroides makraitos* sp. n. paratypes, dorsal view of body of ♀, scale 2 mm; 33, idem, apical abdominal segments of ♂ in lateral view; 34, idem, proctiger in dorsal view, scale 0.5 mm; 35, idem, endosomal sclerites in lateral view, scale 0.2 mm; 36, *Rheumatometroides drepanephoros* sp. n., paratype ♂, scale 0.2 mm, proctiger in dorsal view; 37, idem, endosomal sclerite in lateral view; 38, *Potamometropsis anomalis* sp. n., apex of abdomen ♂ paratype in lateral view; 39, idem, apex of abdomen ♀ paratype in ventral view; 40, idem, ♂ paratype, paramere; 41, idem, ♂ paratype, endosomal sclerites, scales: 38, 39 1 mm; 41, 42 0.25 mm.

lateral view, mesonotum softly convex dorsally, metanotum declivent. Intersegmental suture between meso- and meta- notum as well as anterior margin of first tergite indistinct or lost. Lateral longitudinal suture of metanotum not reaching the level of meso/metanotal intersegmental suture. Posterolateral angle of metaacetabula bilobate. Ventral margin of front femora nearly straight and without ventral tooth in male, slightly concave in female; ratio length: width 5.5 in male, 6.7 in female. Leg measurements, see table 1.

Male. Parameres asymmetrical, fig. 27. In the centre of mesosternum is a small patch of minute black bristles which are not on a tubercle. Endosomal sclerites fig. 30.

Macropterous form as apterous except for development of pronotum and hemielytra. Length ♂ 3.1-3.2, ♀ 3.33; humeral width of pronotum ♂ 1.6-1.7, ♀ 1.74. Pronotum dark brown to black with a pair of clavate yellowish spots on the centre constricted posteriorly, in one male and the female with the light

brown posterior margin of pronotum. Hemielytra extending beyond apex of abdomen, proximally blackish, apically dark brown with black veins, costal margin medium brown.

Comparative notes. – Very similar to *V. xiphibion* which has, however, a more extensive yellow pattern dorsally and different parameres. The colour pattern is intermediate between *V. pulai* and *V. kuiteri* Hungerford & Matsuda, which both have, however, a medioventral tubercle on fore femur in male and somewhat different parameres.

Etymology. – *Xyele* (greek: knife, falchion) a noun in apposition refers to the shape of left paramere.

Ventidius kurtokalami sp. n. (figs. 24, 28, 31)

Type material. – Holotype ♂, allotype ♀ E. Malaysia, Sabah, Danum Valley, 70 km W Lahad Datu, 4 km S main trail W5 nr. Sungai Segama, 150m, middle sized stream and waterfall, 3 Dec. 1989, sample Sab. 54, M. J. & J. P. Duffels

(ZMA); paratype ♂ Sabah, Danum Valley, 70 km W Lahad Datu, main trail W 12, 180m, narrow creek, 2. XII. 1989, sample Sab. 52, M. J. & J. P. Duffels (NC). All apterous.

Description

Apterous specimens. - Dimensions. Length ♂ 2.8-3.0, ♀ 3.45; width of thorax ♂ 2.0, ♀ 2.60. Colour. Eyes and anterior half of interoculus blackish, posterior half of interoculus yellow. Pronotum black, meso- and metanotum with a large central bilobed yellow area. An irregular broad black longitudinal band on border of notum and pleuron. Posterior part of metanotum, basal half of abdominal dorsum black, caudal half largely yellow. Basal third of metapleuron black, apical part largely yellow. Venter yellow with a pair of very small black dots at anterior point of mesoacetabular suture. Apex of rostrum, antennae except for base of first segment, apex of fore femur and rest of fore leg, middle and hind leg blackish.

Antennae when folded back over venter as long as body in male, slightly shorter in female. Length of antennal segments I : II : III : IV, male 1.22 : 0.57 : 0.55 : 0.56, female unknown. Eyes twice as long as head, overlapping lateral margin of prothorax and anterolateral angles of mesothorax. Anterior and posterior margins of pronotum medially concave. In lateral view, mesonotum softly convex dorsally, metanotum declivent. Intersegmental suture between meso- and metanotum as well as anterior margin of first tergite not visible. Lateral longitudinal suture of metanotum not reaching the level of meso/metanotal intersegmental suture. Posterolateral angle of metaacetabula bilobate. Ventral margin of fore femora slightly concave, ventral margin of fore tibia nearly straight in female; fore femur with a low hump, fore tibia ventrally irregular in male (fig. 24). Leg measurements, see table 1.

Male. Parameres nearly symmetrical, fig. 28. In the centre of mesosternum is a small patch of minute black bristles which are not on a tubercle. Endosomal sclerites fig. 31.

Comparative notes. - Although the parameres are nearly symmetrical, this species fits best in subgenus *Venditioides*. *V. kurtakalami* differs from similar species by the form of fore tibia in male.

Etymology. - *Kurtakalami* is a Greek noun meaning 'curved shin' and refers to the structure of male fore tibia.

TREPOBATINAE Matsuda, 1960

Metrobatopsis Esaki, 1926

Representatives of this genus have so far only been found in Papua New Guinea and Solomon Isles.

Stenobates Esaki, 1927

Representatives of this genus have been reported from Singapore and Australia (an undescribed species Andersen 1982 fig. 366). *Stenobates* is very similar to *Rheumatometroides*, the main difference is in the location of the metasternal scent gland opening which in *Stenobates* lies near the anterior margin in the anterior extension, whereas in *Rheumatometroides* the opening lies in the centre of the metasternum.

Rheumatometroides Hungerford & Matsuda, 1958

Two species are known from Papua New Guinea and Solomon Isles (Lansbury 1992). Like *Stenobates* they live on the sea and in estuaries in mangrove and similar habitats. We add two new species from Sulawesi:

Rheumatometroides makraitos sp. n. (figs. 32-35)

Type material. - Holotype ♂, allotype ♀ (RMNH) and 5♂ 2♀ paratypes: Sulawesi Tenggara, Teluk Kendari, 13 Mar. 1989, N8947 (NC, 1♂ 1♀ ZMA 1♂ ZMC), all apterous.

Description

Apterous specimens. - Dimensions. Length ♂ 3.7-4.3, ♀ 4.0-4.2; width of head ♂ 0.90-0.98, ♀ 0.93-0.98; width of thorax ♂ 1.32-1.48, ♀ 1.66-1.70. Colour, interoculus yellow with dark markings, eyes dark, antennae dark, ventral side of first antennal segment, yellowish. Thorax and dorsum of abdomen yellowish with dark markings (fig. 32). Venter yellow, legs light brown with dark stripes.

Eyes large, about two thirds as wide as interoculus. Antennae shorter (0.6) than length of body, first segment with about 10 stiff black setae. Length of antennal segments I : II : III : IV male 1.19 : 0.57 : 0.47 : 0.43; female 0.95 : 0.55 : 0.49 : 0.47. Rostrum relatively stout, reaching anterior quarter of mesosternum. Pronotum distinctly (0.8) narrower than width of head. Meso and metanotum in females with a very broad mesal, weakly chitinized, sulcus (fig. 32), this is not apparent in males. Fore femur of male only very slightly thicker than in female, ventral margin straight without modifications. Fore tibia flattened and somewhat widened apically in both sexes.

Mesosternum 6-7 times as long as metasternum, which is not produced anteriorly. Scent gland opening surrounded by a circular structure situated more or less in the centre of metasternum.

Male. Pregenital sternite three quarters as long as preceding abdominal sternites together. Sternite 8 slightly shorter than sternite 7, sternite 9 slightly shorter than 8. Proctiger with a pair of long thin rostroventrally directed horns (figs. 33, 34). Endosomal sclerites fig. 35.

Comparative notes. – There are two further species in the genus: *R. browni* Hungerford & Matsuda from Solomon Isles and New Britain and *R. serena* Lansbury from Papua New Guinea and New Britain (Lansbury 1992). *R. makraitos* differs from both by having the yellowish mark on pronotum larger, the female in spite of a broader mesonotal sulcus being relatively narrower and the horns of proctiger of male being relatively shorter.

Etymology. – *Makraitos*, a Greek adjective, meaning 'extended' and referring to the broad mesonotal sulcus.

Remarks. – The species was found on very small and shallow puddles between mangrove air roots. If disturbed they jumped over the wet mud to the next puddle. Despite their small size they are rather quick and, as the net is hampered by the air roots, difficult to catch.

Rheumatometroides drepanephoros sp. n.
(figs. 36-37)

Type material. – Holotype ♂, allotype ♀ (RMNH), and 9 ♂ 10 ♀ paratypes: Sulawesi Tenggara, Teluk Kendari, Pulau Nambo, 13 Mar 1989, N8945 (NC, 1 ♂ 1 ♀ MBBJ 1 ♀ BPUH 1 ♂ 1 ♀ JTPC 1 ♂ 1 ♀ ZMA 1 ♂ 1 ♀ ZMC), all apterous.

Description

Apterous specimens. – Length ♂ 3.0-3.5, ♀ 3.2-3.5; width of head ♂ 0.87-0.90, ♀ 0.89-0.91; width of thorax ♂ 1.15-1.20, ♀ 1.32-1.40. Colour, interoculus yellow with a broad median brown stripe, widened posteriorly with a small yellowish dot in the wide part. A pair of brown lines at inner margins of eyes also widened posteriorly and two sublateral brown lines converging anteriorly and fused there with the median stripe. Eyes dark, first antennal segment yellowish with a dorsal brown line, segments 2-4 ventrally light, dorsally medium brown. Pronotum brown with a pair of more or less circular yellow spots covered with pruinose silvery grey pubescence. Mesonotum yellowish with a pair of submesal and a pair of lateral longitudinal brown stripes, not fused with the broadly brown hind margin, posterior yellowish part covered with silvery grey pubescence. In females this pattern is split by the broad yellowish cutaneous part. Abdominal terga largely brown, in females alternating with yellow transverse stripes, connexiva dark yellowish. First genital tergite yellowish, second basally yellowish, apically brownish. Venter yellow, legs light brown with dark stripes.

Eyes large, about two thirds as wide as interoculus. Antennae shorter (0.7) than length of body, first segment with 7-12 stiff black setae. Length of antennal segments I : II : III : IV male 0.71 : 0.51 : 0.48 : 0.49; female 0.67 : 0.49 : 0.48 : 0.51. Rostrum relatively

stout, reaching anterior quarter of mesosternum. Pronotum distinctly (0.7) narrower than width of head. Meso and metanotum in females with a very broad mesal, weakly chitinated, sulcus, this is not apparent in males.

Fore femur of male not noticeably thicker than in female, ventral margin straight without modifications. Fore tibia flattened and somewhat widened apically in both sexes. Leg measurements, see table 1.

Mesonotum 6-7 times as long as metasternum, which is not produced anteriorly. Scent gland opening surrounded by a circular structure which is more distinct in males than in females, situated near the anterior margin of metasternum. Leg measurements, see table 1.

Male. Pregenital sternite one third as long as preceding abdominal sternites together. Sternites 8 and 9 of subequal length, about three quarters as long as sternite 7. Proctiger with a pair of relatively short crescent shaped rostroventrally directed horns (fig. 36). Endosomal sclerites fig. 37.

Comparative notes. – The appendages of the proctiger of male are similar in form, though somewhat shorter, as those in *R. serena* Lansbury and *R. browni* Hungerford & Matsuda, which both have a different pronotal pattern with a single median yellowish spot. *R. makraitos* sp. n. is larger has also a different colour pattern and the proctiger horns are more or less straight.

Etymology. – *Drepanephoros* (Greek adjective meaning bearing a sickle or scythe) refers to the form of the appendages of the proctiger in the male.

Remarks. – This species was found on a small stream with a sand/clay bottom flowing through a coconut plantation into the bay of Kendari. The plantation is on a very small island, Pulau Nambo, in the bay. This habitat is structurally quite different from the one in which the preceding species was found.

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